ASSESSMENT OF EXPOSURE TO CIGARETTE SMOKE: PILOT STUDY RESULTS ~~FOR CARBON MONOXIDE AND SEVERAL BIOMARKERS OF POTENTIAL HARM~~

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This pilot study was conducted to aid in the development of the experimental design for a large study of exposure of adult smokers in the U.S. to selected cigarette smoke constituents. A secondary objective of the pilot study was to explore the feasibility of analysis and utility of the measurements of several biomarkers of potential ~~harm~~. Standard clinical chemistry methods were utilized in ~~all~~ analyses.

The study included 69 adult smokers of ~~any brand~~ of 3.0 – 6.9 mg tar ~~yield~~ (FTC method) ~~manufactured cigarettes~~ and 66 non-smokers. For assessment of exposure ~~levels of~~ carbon monoxide, CO in exhalate and carboxyhemoglobin were measured on weeks 1, 2, 3 and 6 of the six-week pilot study. The ~~average level~~ of CO in the exhalate of smokers ~~over~~ was 25.3 ppm (± 14.4), while that for non-smokers was 5.6 ppm (± 1.8). These differences are statistically significant ~~with a~~ ($p \leq 0.001$). ~~The mean carboxyhemoglobin levels over the same timeframe~~ were 4.3% (± 2.8) for smokers and 0.6% (± 0.4) for non-smokers ~~(data < the limit of quantitation (0.3%), ~50% of non-smokers, omitted from calculation of mean.)~~ These differences are also statistically significant ~~with a~~ ($p \leq 0.001$).

~~Biomarkers of potential harm, which were studied, the health effect they represent, and average results are summarized in the table below.~~

From these data, we conclude that 1) the carboxyhemoglobin measurement provides an acceptable measure of CO exposure and avoids a sample collection time requirement that would be difficult to achieve in a large study; 2) overall values for 11-dehydrothromboxane B_2 and 8-epi-prostaglandin $F_{2\alpha}$ indicate that there is a statistically significant difference between smokers and non-smokers; and 3) malondialdehyde in urine does not distinguish between smokers of 3.0 – 6.9 mg tar yield (FTC method) cigarettes and non-smokers.

Biomarker	Health Effect	Smoker	Non-smoker	p
11-dehydrothromboxane	Thrombosis, platelet activation	1023.3 ± 464.6 pg/mg creatinine	766.0 ±274.1 pg/mg creatinine	≤0.001
8-epi-prostaglandin $F_{2\alpha}$	Lipid peroxidation, atherosclerosis	1927.1 ± 936.1 pg/mg creatinine	1140.0 ± 369.0 pg/mg creatinine	≤0.001
malondialdehyde	Oxidative stress	0.002 ± 0.0009 µmol/mg creatinine	0.002 ± 0.0010 µmol /mg creatinine	

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